S P E C I F I C A T I O N

INLINE SKATE BRAKE

CROSS-REFERENCE TO PRIOR APPLICATIONS

Provisional applications on the subject invention were filed on January 27, 2003, assigned Serial No. 60/443,265. and May 5, 2003, and assigned Serial Nos. 60/467,296.

BACKGROUND OF THE INVENTION

The field of the invention is inline skate brakes and the invention relates more particularly to inline skate brakes of the type which use a "diabolo." The term "diabolo" is intended to mean a roller which has two halves and a center portion with a reduced diameter. A typical diabolo used on an inline skate is shown in Figure 2 of U.S. Patent No. 5,938,213. As the diabolo is brought into contact with a wheel or two wheels, the two halves of the diabolo, referred to in the '213 patent as disks, move outwardly so that their outer surface rubs against the chassis, causing a braking action.

Another diabolo as shown in U.S. Patent No. 5,895,061 which refers to a brake having a pair of disks 9. The disks 9 have a frusto conical face facing the wheels 11 and diabolos are held away from the wheels by a spring 13. When the disks 9 come into

contact with the wheel, they are moved apart and pressed against the arms of lever 11. U.S. Patent No. 5,639,104 shows a skate brake which has a diabolo with frusto conical disks, shown for instance in Figures 2, 3, 4, and 5.

U.S. Patent No. 6,065,751 shows a cylindrical braking wheel which contacts the outer surface of one or more of the wheels of an inline skate.

BRIEF SUMMARY OF THE INVENTION

The present invention is for a brake assembly for inline skates which have a frame supported by a boot portion. The frame has a right and left downwardly directed frame member. The frame holds at least three axles, and usually four, for supporting wheels. A preferred version of the brake assembly has a right and a left carrier plate positioned along a portion of the inner face of the downwardly directed frame members. Each downwardly directed frame member has an inwardly directed protrusion around each axle opening, which abuts the wheel bearing of each wheel and holds the wheel away from the frame. A right and a left carrier plate is positioned along a portion of the inner face of the frame. The carrier plate has elongated openings which are positioned over the bearing supporting protrusions of the frame. The carrier plate can move back and forth, up and down, or at an

angle depending upon the shape of the elongated openings. The carrier plates hold a plurality of diabolos. The diabolos do not contact the wheels when the carrier plate is in a disengaged position and contact the wheels when the carrier plate is in an engaged position. Means are provided for movably controlling the position of the carrier plate, preferably by use of a collar around the ankle of the boot.

A preferred configuration of diabolo is a single diabolo having a curved recess, although two separated disks can be used. The preferred diabolo has an elastic portion so that when it contacts a wheel, it stretches outwardly and its outer faces contact the carrier plate to provide a braking action.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING

Figure 1 is an exploded perspective view of the underside of an inline skate showing the frame of the skate and the pair of carrier plates. The carrier plates are shown as supporting a plurality of diabolos.

Figure 2 is a side view of an inline skate having a skate brake of the present invention having vertically oriented openings.

Figure 3 is a side view of an inline skate having the skate brake of the present invention having horizontally oriented elongated openings.

Figure 4 is a side view of two wheels having a diabolo held on a pair of pivoted levers therebetween.

Figure 5 is a cross-sectional view of a diabolo useful with the present invention.

Figure 6 is an end view of the diabolo of Figure 5.

Figure 7 is a side view of an alternate configuration of the diabolo useful with the brake of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

An inline skate is shown in perspective view in Figure 1 and indicated generally by reference character 10. Inline skate 10 has a boot portion 11 with a frame 12 affixed to the bottom thereof. Frame 12 has a right downwardly directed frame member 13 and a left downwardly directed frame member 14. Each of the right and left frame members have four axle openings 17 for supporting wheel axles. Each axle opening has an inwardly directed bearing supporting protrusion 15. Each protrusion 15 has an outer dimension indicated by the arrow 16. Each axle opening is indicated by reference character 17.

A right carrier plate 18 and a left carrier plate 19 each have two elongated openings 20. Each elongated opening has a major dimension 22 and a minor dimension 21. The minor dimension 21 is about equal to the outer dimension 16 of protrusion 15. In this way, each carrier plate can slide along the elongated openings back and forth or up and down or at an angle while being guided by contact with the protrusions 15. A spoke 9 can function either as a tension member or as a force applying member. In Figure 1, it functions in both forms since when collar 37 moves forward, spoke 9 pushes the carrier plates forward through bolt and nuts 8. The spoke 9 may be adjustable by turning wing nut 7 or other conventional adjustment means such as that shown in Fig.4. It is contemplated that a TEFLON or other high slip polymer ring could be placed around the protrusions 15 to reduce friction and wear between the carrier plates and the protrusions. The carrier plates 18 and 19 are preferably steel having a thickness of only about 0.028. In this manner, they fit within a conventional frame and require very little change in design or appearance of the frame.****

In one configuration diabolo 23 has a separate right half 24 and a left half 25. The face of the right and left halves 24 and 25 are preferably curved as shown in Figure 7. The curved face has several important advantages. Firstly, it contacts a greater

area of a wheel, such as wheel 26 shown in Figure 2. Increased contact forces the halves 24 and 25 outwardly so that an outer portion 30 and 31 rubs against the carrier plates 18 and 19. Halves 24 and 25 are rotatingly supported by an axle 32 and are free to move in and out along axle 32, as well as to freely rotate thereon. (see Fig. 7) The axle may be shaped so that it can't turn with respect to the carrier plates 18 and 19. This can be accomplished by anti-rotational geometry wherein the bolt is recessed into a non-circular recess in the carrier plates. It can also be accomplished by screws or rivets.

Referring to Figure 2, the carrier plate is a pivoted carrier plate 34 which is supported by a pivot 35, which is supported around protrusion 36. The elongated openings 33 are vertically oriented and the carrier plates are shown in an upward or braking configuration in Figure 2. There is, of course, an identical carrier plate 34 on the other side of the inline skate of Figure 2.

A tension member 41 may be a cable or spoke which is assigned to the back of a collar 37 which is pivotally supported by pivots 38 held by boot 11. As collar 37 moves back, tension member 41 lifts upwardly lifting carrier plates 34 pivotally upwardly so that diabolos 23 contact wheels 26, 27, and 28. When collar 37 is in its forward normal position, carrier plates 34

are lowered so that diabolos 23 do not contact wheels 26, 27, and 28. There is preferably no contact between a diabolo and front wheel 29. The tension member may be configured as a force applying member, such as a spoke, which would be configured to transmit a downward movement of the back of a collar to the carriers.

Turning now to Figure 3, the carrier plates are indicated by reference character 39 and have horizontally aligned openings 40, which are likewise supported by protrusions 15. A cable is shown in a braking position 41 in Figure 3 and in a normal riding position 41'.

When the collar 37 is in a braking position, the carrier plates 39 are moved rearwardly so that the diabolos 23 contact wheels 26, 27 and 28 and are spread apart in the manner indicated in Figure 7. When collar 37 is in a non-braking position, a return spring 42 urges the carrier plates 39 forwardly so that they are free of contact with wheels 26, 27, and 28.

An especially preferred diabolo configuration is shown in Figures 5 and 6 where the diabolo is indicated by reference character 43. Diabolo 43 has a one piece elastomeric or polymeric body 44 which is flexible enough to be moved outwardly by contact with the wheel 26. As it moves outwardly, the frictional rings 45 and 46 abut the carrier plates 19 and 18,

respectively. There is a further braking action caused by the curved shape of the diabolo. It is to be understood that the outer peripheral edge 47 of wheel 26 moves at a faster linear speed than a more inwardly positioned portion 48. Since the diameter of the wheel is much greater than the diameter of the diabolo, these relative speeds change so that there is a rubbing action caused by the mating of the wheel with the curved surface of the diabolo. This rubbing action provides additional braking force and the heat from this braking force is readily dissipated by the large surface of the wheel especially when the wheel is in contact with a skating surface cooler than itself. The result is a more efficient and less likely to overheat brake. A steel hollow cylindrical axle 48 reduces the rotational friction of diabolo 43 around an axle. The elastomeric or polymeric body may be fabricated from polyurethane, rubber, polytetrafluoro ethylene, polyetheretherketone, polyetheretherimide and phenolic based resins.

A braking assembly using a pair of levers 50 is shown in Figure 4. A split carrier pivot 51 supports levers 50 with respect to the frame halves 13 and 14 not shown in Figure 4, but analogous to that shown in Figure 1. The elastomeric body may be fabricated from polyurethane or rubber. The curved shape of the

inner portion of the diabolo may be elliptical, round, parabolic, hyperbolic, or poly curved.

A diabolo 52 shown in phantom view is supported by an axle 53 held in elongated opening 54. Levers 50 are moved up and down by the connection of rod 55 with a spoke or other rigid member attached to collar 37 in a manner known to those skilled in the art. As the collar is pivoted rearwardly, rod 55 moves downwardly forcing diabolo 52 against wheels 56 and 57. As shown by comparing Figures 2, 3, and 4, the diabolos may be above, at, or below the level of the axles of the wheels of the inline skate.

The present embodiments of this invention are thus to be considered in all respects as illustrative and not restrictive; the scope of the invention being indicated by the appended claims rather than by the foregoing description. All changes which come within the meaning and range of equivalency of the claims are intended to be embraced therein.